

Chapter 7 System of Equations**Section 7.3: Using Graphing Technology to solve A system of linear Equations****Focus:** Determine and verify the solution of a linear system using graphing technology.**Make Connections**

In 2006, the population of Canada was 31 612 897. The population of the eastern provinces was 12 369 487 more than the population of the territories and western provinces.

a. What linear system models this situation?

let (E) be the population of Eastern provinces

let (W) be the population of Western provinces

$$E + W = 31\,612\,897 \rightarrow [1]$$

b. Why can't you determine an exact solution by graphing on grid paper?

$$E = W + 12\,369\,487 \rightarrow [2]$$

because the numbers are too big to graph.

$$W = E - 12\,369\,487 \rightarrow [2]$$

To solve a linear system on a TI-83 or TI-84 using the CALC feature:

Steps	Display
Press [Y=] . Enter the equations in slope-intercept form. Press [WINDOW] to change the window settings.	<div> Plot1 Plot2 Plot3 Y1=X+3 Y2=2X-2 Y3= Y4= Y5= Y6= Y7= </div> <div> WINDOW Xmin=-10 Xmax=10 Xscl=1 Ymin=-10 Ymax=10 Yscl=1 Xres=1 </div>
Press [GRAPH] to view the lines. Adjust the [WINDOW] settings if necessary.	
Press [2nd] [TRACE] to view the CALCULATE menu. Move the cursor down to 5:intersect, then press [ENTER] . Press [ENTER] 3 more times to view the coordinates of the point of intersection at the bottom of the screen.	<div> CALCULATE 1:value 2:zero 3:minimum 4:maximum 5:intersect 6:dy/dx 7:∫f(x)dx </div> <div> Intersection X=5 Y=8 </div>

Example 1: Using graphing technology to solve a linear system with equations in slope-intercept form

Solve the following linear system:

$$y = -\frac{1}{2}x + 5 \quad \& \quad y = 3x - 4$$

Sketch the window of the graphing calculator

$$y = mx + b$$

$$y_1 = -\frac{1}{2}x + 5$$

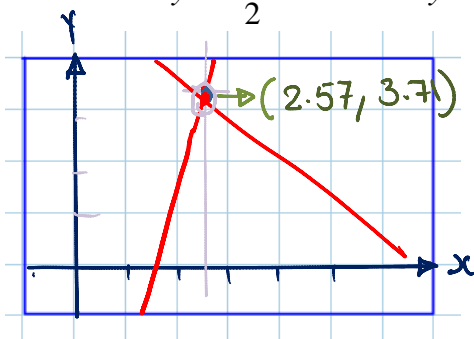
$$b = +5$$

$$m = -\frac{1}{2}$$

$$y_2 = 3x - 4$$

$$b = -4$$

$$m = \frac{3}{1}$$



solution (2.57, 3.71) - approximate

Is your solution exact or approximate?

Chapter 7 System of Equations**Section 7.3: Using Graphing Technology to solve A system of linear Equations****Example 2:** Using graphing technology to solve a linear system with equation in different forms

Alan's school had a carnival to celebrate *Festival du Voyageur*. The school raised \$1518.75 by charging an adult \$3.75 and a student \$2.50. The total attendance was 520.

How many adults and how many students attended?

- a. Write a linear system to model this situation.

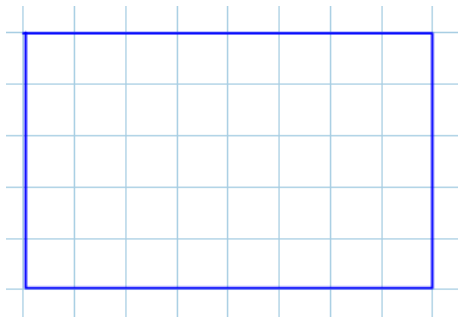
$$\begin{aligned} A + S &= 520 \longrightarrow \textcircled{1} \\ 3.75A + 2.5S &= 1518.75 \longrightarrow \textcircled{2} \end{aligned}$$

let (A) be the # of Adults attend.
let (S) be the # of students attend.

- b. Express each equation in slope-intercept form. Graph each line.

$$\begin{aligned} A + S &= 520 \longrightarrow A = 520 - S \longrightarrow \textcircled{1}' \\ 3.75A + 2.5S &= 1518.75 \quad \frac{3.75A}{3.75} = \frac{1518.75 - 2.5S}{3.75} \end{aligned}$$

- c. Sketch the window of the graphing calculator



$$A = 405 - 0.666\bar{6}S \longrightarrow \textcircled{2}'$$

- d. Determine the coordinates of the point of intersection of the lines. Are these coordinates exact Or approximate?

- e. Verify your solution by using the data in the given problem